Should the concept of Network-Centric Warfare form a central pillar of the Australian Army's transformation, as articulated in the Hardened and Networked Army Concept?

A Monograph

by

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AY 06-07

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

1. REPORT DATE *(DD-MM-YYYY)* 008-05-2007	2. REPORT TYPE MMAS Monograph	3. DATES COVERED *(From - To)* Jul 2006 - May 2007

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Should the concept of Network-Centric Warfare form a pillar of the Australian Army's transformation, as articulated in the Hardened and Networked Army Concept?	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S) McDonald, Jamie	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Command and General Staff College ATTN: ATZL-SWD-GD 1 Reynolds Ave. Ft. Leavenworth, KS 66027-1352	8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT This monograph addresses whether the Australian Army's vision of a network-enabled force is a pragmatic response to the challenges of the future operating environment, or if NCW is truly an 'emerging theory of war in the information age' as articulated by the theory's supporters. While the delineation between network-enabled and network-centric may seem trivial to some observers, it is fundamental when considering how the Australian Army plans to conduct military operations in the future, with implications throughout the DOTMLPF domains of the Australian Army. The centrality of NCW concepts in future force planning is equally applicable for other modern military forces. For the United States Army in particular, the question of NCW is particularly relevant as it conducts its own transformation and is determining whether lethality enabled through NCW technology will provide a decisive warfighting advantage, or whether a degree of conventional force mass is still required for future conflict, especially against asymmetric forces.

15. SUBJECT TERMS
network-centric warfare, network-enabled warfare, theory of warfare, transformation, revolution in military affairs, John Boyd, air power theory.

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE		59	19b. TELEPHONE NUMBER *(include area code)*
Unclassified	Unclassified	Unclassified	UU		

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

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Title of Monograph: Should the concept of Network-Centric Warfare form a central pillar of the Australian Army's transformation, as articulated in the Hardened and Networked Army Concept?

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Abstract

Should the concept of Network-Centric Warfare form a central pillar of the Australian Army's transformation, as articulated in the Hardened and Networked Army Concept?

By Major Jamie McDonald, Royal Australian Armoured Corps, 59 pages.

The Australian Army has commenced a process of transformation to meet the demands of the increasingly complex operational environment in which it is currently operating, and will continue to operate in the foreseeable future. The Australian Government in 2000 significantly amended strategic guidance for the Australian Defence Force (ADF). The Australian Government's 2000 Defense White Paper, *Defending Australia* tasked the ADF to prepare for operations not only in the defense of the Australian homeland, but as an expeditionary force that could seamlessly be employed in coalition operations with our allies throughout the world.

The Australian Army has responded to this strategic guidance, by annunciating the transformation of the force in the 'Hardened and Networked Army' concept. As part of this transformation, the Australian Army aims to gain advantage through the concept of a 'network-enabled' Army. This approach is only a slight modification of that proposed in the Australian Department of Defence document entitled the *Network-Centric Warfare Roadmap*, which describes how the concept of Network-Centric Warfare (NCW) will be incorporated into the ADF. The United States Department of Defense office of Force Transformation's vision of future warfare, as described in its pamphlet, *The Implementation of Network-Centric Warfare*, places much greater emphasis on the 'centrality' of NCW to all future warfighting concepts.

This monograph will therefore address whether the Australian Army's vision of a network-enabled force is a pragmatic response to the challenges of the future operating environment, or if NCW is truly "an emerging theory of war in the Information Age" as articulated by the theory's supporters. While the delineation between network-enabled and network-centric may seem trivial to some observers, it is fundamental when considering how the Australian Army plans to conduct military operations in the future, with implications throughout the Doctrine, Organization, Theory, Material, Logistic, Personnel, and Facilities (DOTMLPF) domains of the Australian Army. The centrality of NCW concepts in future force planning is equally applicable for other modern military forces. For the United States Army in particular, the question of NCW is particularly relevant as it conducts its own transformation and is determining whether lethality enabled through NCW technology will provide a decisive warfighting advantage, or whether a degree of conventional force mass is still required for future conflict, especially against asymmetric forces.

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INTRODUCTION

The Australian Army has commenced a process of transformation to meet the demands of the increasingly complex operational environment in which it is currently operating, and will continue to operate in the foreseeable future. The Australian Government in 2000 significantly amended strategic guidance for the Australian Defence Force (ADF). The Australian Government's 2000 Defense White Paper, *Defending Australia* tasked the ADF to prepare for operations not only in the defense of the Australian homeland, but as an expeditionary force that could seamlessly be employed in coalition operations with our allies throughout the world.

The Australian Army has responded to this strategic guidance, by annunciating the transformation of the force in the 'Hardened and Networked Army' concept.[1] As part of this transformation, the Australian Army aims to gain advantage through the concept of a 'network-enabled' Army. This approach is only a slight modification of that proposed in the Australian Department of Defence document entitled the *Network-Centric Warfare Roadmap*, which describes how the concept of Network-Centric Warfare (NCW) will be incorporated into the ADF.[2] The United States Department of Defense office of Force Transformation's vision of future warfare, as described in its pamphlet, *The Implementation of Network-Centric Warfare*, places much greater emphasis on the 'centrality' of NCW to all future warfighting concepts.[3]

This monograph will therefore address whether the Australian Army's vision of a network-enabled force is a pragmatic response to the challenges of the future operating environment, or if NCW is truly "an emerging theory of war in the Information Age" as

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[1] AS DoD Pamphlet, *The Hardened and Networked Army*, (Canberra ACT: Defence Publishing Service, 2005)

[2] AS DoD Paper, *NCW Roadmap*, (Canberra ACT: Defence Publishing Service, 2005)

[3] US DOD Pamphlet, *The Implementation of Network-Centric Warfare,* (Washington DC: Government Printing Office, 2005)

articulated by the theory's supporters. [4] While the delineation between network-enabled and network-centric may seem trivial to some observers, it is fundamental when considering how the Australian Army plans to conduct military operations in the future, with implications throughout the Doctrine, Organization, Theory, Material, Logistic, Personnel, and Facilities (DOTMLPF) domains of the Australian Army. The centrality of NCW concepts in future force planning is equally applicable for other modern military forces. For the United States Army in particular, the question of NCW is particularly relevant as it conducts its own transformation and is determining whether lethality enabled through NCW technology will provide a decisive warfighting advantage, or whether a degree of conventional force mass is still required for future conflict, especially against asymmetric forces.

To answer these questions, the first section of this monograph will investigate the intellectual foundation for the theory of NCW through the lens of its major proponents. The two most influential authors who championed NCW theory are the late Admiral Cerbrowski, the former head of the United States Department of Defense Office of Force Transformation, and Doctor David Alberts, the Director, Research and Strategic Planning at the Office of the Assistant Secretary of Defense (US). This section will review much of the literature pertaining to NCW, but will also address the published arguments of the critics of this concept. The conclusion of this section will highlight the strengths and weaknesses of the concept, and its application and relevance for the contemporary operating environment.

The second section of the monograph will address the theory of NCW by contrasting its central tenets against other historical military theorists who have influenced current US and Australian doctrine, particularly the works of Clausewitz, Jomini, and Boyd. As most Australian

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[4] US DOD Pamphlet, *The Implementation of Network-Centric Warfare,* P.3

and United States Military Doctrine is grounded in theories articulated by these military theorists, it is important to understand how NCW nests within their overarching theories or philosophies of warfare. This section will review the ongoing debate as to the continued relevance of these military theorists, and how they inform the modern debate on whether technological evolution will make the dynamics of warfare more easily examined and understood, and provide an advantage to the combatant with the greatest situational awareness. This section will also question where NCW fits into the ongoing military debate between the competing requirements of quality and mass within the design of military forces, and how these ideas have influenced conflict throughout modern history.

After considering how NCW can be viewed within the context of other military theories, the monograph will discuss how throughout the history of warfare, revolutions in military affairs have only provided an initial advantage over an adversary. Due to the adaptive nature of most military systems, short term advantages gained through technological advances or organizational changes will soon be nullified by a competitor. To demonstrate the failure of an emerging theory of warfare to become a true Military Revolution, this section will discuss the parallels between the Air Warfare Theorists of the early Twentieth Century, and the proponents of NCW. Where the Air Warfare Theorists believed that air warfare would make traditional ground warfare obsolete, the proponents of NCW believe that the exploitation of information age technology can provide a distinct military advantage over an adversary with the use of smaller forces. This section will highlight the potential danger of over-reliance on a perceived military advantage gained through the development of a new technology.

The fourth and last section of the monograph will investigate and discuss the Australian Army's planned transformation, as articulated in the Hardened and Networked Army concept. This section will investigate the linkages between the current strategic guidance for the employment of Australian ground forces, and how this guidance is nested within the Australian Future Land Operational Concept (FLOC) which is encapsulated in the document, *Complex*

Warfighting. [5] This section will then discuss how the network-enabled army concept forms the second pillar of the Hardened and Networked Army, by leveraging advantage of information and technology, but not making it the central concept of how the Australian Army plans to fight in the future. This section of the monograph will finally compare the Australian Army's vision of a network-enabled Army, with the concept of NCW as described in the Australian Defence Force's *Roadmap to Network-Centric Warfare.* This section will also critique the United States Department of Defense Office of Force Transformation pamphlet, *The Implementation of Network-Centric Warfare*, which argues that NCW will form the central concept for how the United States Armed Forces will fight in the future. This section will highlight the danger of overemphasizing the potential benefit of NCW, and argue that the US Armed Forces should adopt a more moderate approach to the implementation of NCW, more in line with the Australian Army's Network-Enabled architecture.

The monograph will conclude by answering the central question as to whether the Australian Army's approach to the concept of NCW is appropriate for its process of transformation under the Hardened and Networked Army concept. The conclusion will also compare the benefit of utilizing the Australian Army's Network-Enabled approach to future warfare, as opposed to the more central employment of NCW concepts for the ADF and the United States Armed Forces.

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[5] Australian Army. *Complex Warfighting.* Available from the internet at www.defence.gov.au.

NETWORK-CENTRIC WARFARE – REVOLUTION OR FALLACY?

Introduction

While much scholarly opinion appears to be divided as to the importance of NCW to future conflict and whether it actually represents a Military Revolution or even a Revolution in Military Affairs (RMA), many western military forces are increasingly investing intellectual and economic capital to leverage advantage through this concept. [6] A philosophical divide has emerged between the supporters and detractors of NCW, largely linked to their philosophical understanding and belief of the true nature of warfare.

This section will clarify the true nature of NCW, by defining its key concepts and explaining the language used to describe Information Age Warfare. To do this it will introduce NCW through the ideas of its greatest proponent, the late Admiral Cerbrowski, the former head of the United States Department of Defense Office of Force Transformation who is often described as the father of NCW. It will also investigate the work of Doctor David Alberts, the Director, Research and Strategic Planning at the Office of the Assistant Secretary of Defense (US). These two authors present much of the underlying theoretical basis of NCW through a variety of articles and published works.

A synthesis of Cerbrowski and Alberts' arguments was presented in the DOD *Network Centric Warfare Report to Congress*, which provides a positive view of the future role of NCW

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[6]Definition of Revolution in Military Affairs as defined by Knox, MacGregor and Murray, Williamson. *The Dynamics of Military Revolution 1300-2050.* (Cambridge: Cambridge University Press, 2003) PP. 11-14.

for the US DOD. [7] This section will review the potential benefits of NCW to military forces presented by its supporters, before examining the counter-arguments of the NCW critics. Many of the critics of NCW do not question the advantage that can be leveraged from information age technology, but whether this technology alone will provide a war winning advantage over future military adversaries. The section will conclude by examining whether NCW can be defined as a Military Revolution, Revolution in Military Affairs (RMA), or neither.

Definition of NCW Concepts

The proponents of NCW argue that warfare takes on the characteristics of its Age, and as such, NCW continues this trend by becoming the military response to both the challenges and the opportunities created by the Information Age. Admiral Cerbrowski in his article, *Network-Centric Warfare – An Emerging Response to the Information Age*, provides an explanation of NCW:

> Network-centric warfare (NCW) is about human and organizational behavior. It focuses on attaining access – access to gather, process, and manage information to take advantage of the growing power resident in information networks. It offers a method to build information superiority, a key factor to success in the future battlespace. It facilitates the creation and sustaining of shared awareness at all command levels. Network-centric warfare supports speed of command – the conversion of superior information position to action. When geographically dispersed forces enjoy information superiority, they can self-synchronize or self-organize to accomplish time-urgent tasks. In brief, NCW is not narrowly about technology, but broadly about an emerging military response to the information age. [8]

Cerbrowski's explanation of NCW encapsulates many of the conceptual themes and ideas being presented by the proponents of the theory, but it does not provide a clear definition that bounds the concept. Cerbrowski argues that this is acceptable, as NCW is a concept, and as such

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[7] DOD. *Network Centric Warfare Report to Congress.* (Washington: U.S. Government Printing Office, 2003).

[8] Arthur K. Cebrowski, *Network-Centric Warfare: An Emerging Response to the Information Age. Military Technology.* Vol. 27, Issue 5: 16-22, 2003. P. 16

"…it cannot have a definition, because concepts and definitions are enemies. Concepts are abstract and general, while definitions are concrete and specific."[9] While Cerbrowski would prefer not to define NCW, a pragmatic definition was provided to the Congress in the DOD *Network Centric Warfare Report to Congress* which stated that "The term, NCW, provides a useful shorthand for describing a broad class of approaches to military operations that are enabled by the networking of the force. "Networking the Force" entails much more than providing connectivity among force components in the physical domain. It involves the development of doctrine and associated tactics, techniques, and procedures that enable a force to develop and leverage an information advantage to increase combat power."[10]

Proponents of NCW argue that warfighters employing NCW concepts can leverage shared situational awareness and knowledge to increase their own survivability, lethality, speed, timeliness, and responsiveness on the modern battlefield. The ability to conduct NCW is the result of advances in four areas of technology – sensors, data processing, communications, and precision-guided weapons. To understand how this advantage can be leveraged, they focus on the interrelationship in warfare that takes place simultaneously throughout the physical, the informational and the cognitive domains.[11] The physical domain is defined as the traditional domain of warfare, where the actions of strike, protect and maneuver take place throughout the land, sea, air and space environments. The information domain is where information lives – where it is created, manipulated and shared. It is the domain that facilitates communication of

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[9] Cebrowski. *Network-Centric Warfare: An Emerging Response to the Information Age.*, P. 16
[10] DOD. *The Implementation of Network-Centric Warfare.* (Washington: U.S. Government Printing Office, 2005.) P.3-1
[11] David S. Alberts, John J. Garstka, Richard E. Hayes, and David T. Signori, *Understanding Information Age Warfare.* (Washington D.C.: DoD Command and Control Research Program, 2004.) P.10

information among warfighters and the domain where command and control are exercised. Finally the cognitive domain is the domain within the mind of the warfighter and the supporting populace. This domain is where the intangible attributes of military command, leadership and actions belong. [12] The key attributes of the cognitive domain have not changed remarkably throughout the history of warfare, and were examined in detail by Carl Von Clausewitz in his study, *On War.* [13]

Cerbrowski defines the most important aspects of NCW as "information superiority, shared awareness, adaptability and self-synchronization". [14] Information superiority is a relative concept, which means that a force has developed an advantage in the dimensions of information relevance, accuracy and timeliness, while adversaries are marginalized in those dimensions. This advantage allows a superior degree of situational awareness to be developed through the use of sensor, command and control and engagement grids within the overall friendly network. This information superiority is then linked to the second aspect of NCW, being shared awareness. Shared awareness can extend across all levels of command, and is designed to provide the backdrop for a common operational picture for friendly forces.

The third aspect of NCW is adaptability. The idea of adaptability is grounded in the concept of complexity theory, which requires any system to continually modify itself to remain relevant in a changing environment. [15] Adaptability speaks to the requirement for future plans and operations to be able to adapt rapidly to the prevailing situation.

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[12] Alberts, Garstka, Hayes, and Signori. *Understanding Information Age Warfare.* PP 10-14.
[13] Carl Von Clausewitz. *On War.* Princeton: Princeton University Press, 1989. (Edited and Translated by Howard, Michael. and Paret, Peter)
[14] Cebrowski. *Network-Centric Warfare: An Emerging Response to the Information Age.*, P. 17.
[15] Cebrowski. *Network-Centric Warfare: An Emerging Response to the Information Age.*, P. 17

The last concept of self-synchronization is the least understood, and arguably the most optimistic concept presented to support NCW. Self-synchronization is considered the ultimate in achieving increased tempo and responsiveness from military forces. Self synchronization is a mode of interaction between two or more entities that are robustly networked, have shared awareness, follow a rule set based on commander's intent and have a value adding interaction process. "The combination of a rule set and shared awareness enables the entities to operate in the absence of traditional hierarchical mechanisms for command and control. The rule set describes the desired outcome in various operational situations. Shared awareness provides a mechanism for communicating the ongoing dynamics of the operational situation and triggering the desired value-adding interaction."[16]

The proponents of NCW believe that by harnessing the power of voice and data networks and the information that they transmit, that NCW will alter the behavior of potential adversaries and provide a military advantage for friendly forces utilizing its power. However these proponents also note that this style of warfare will require a cultural change within military forces, followed by the continued investment in future technologies to provide the backbone required to truly network the joint and coalition forces. Cerbrowski argued that if the future force can meet these challenges, in future combat "NCW will be the hinge on which the strategic gate swings to neutralize adversarial actions in the shortest possible time at the lowest possible costs."[17]

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[16] David S. Alberts, John J. Garstka, and Frederick P. Stein. *Network Centric Warfare – Developing and Leveraging Information Superiority.* 2nd ed. (Revised). (Washington D.C.: DoD Command and Control Research Program, 2002.) PP. 175-176

[17] Cebrowski. *Network-Centric Warfare: An Emerging Response to the Information Age.*, P. 22

Potential Military Advantage of NCW

The proponents of NCW believe that the potential military advantage that can be gained through NCW is so significant, that it represents an emerging theory of war.[18] These proponents have identified four tenets that comprise the core of NCW as an emerging theory of war in the information age. The four tenets are as follows: a robustly networked force improves information sharing; information sharing enhances the quality of information and shared situational awareness; shared situational awareness that enables collaboration and self-synchronization, and enhances sustainability and speed of command; and finally, that these in turn, dramatically increase mission effectiveness. [19] These tenets are designed to support, "The working hypothesis of network-centric warfare (NCW) as an emerging theory of war, simply stated, is that the behavior of forces, i.e. their choices of organizational relationships and processes, when in the networked condition, will outperform forces that are not."[20] The proponents of NCW however fail to delineate at what level of warfare the theory is most applicable.

As a new theory of warfare, it is argued that NCW will have a profound impact on the planning and conduct of war by allowing forces to increase the pace and quality of decision making. Future commanders will be able to use networked capabilities to quickly develop situational awareness and understanding, rapidly communicate critical information to friendly combat forces, and marshal the appropriate capabilities to exert massed effects against an adversary.[21] In fact the DOD Office of Force Transformation believes that the potential of NCW

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[18] DOD. *The Implementation of Network-Centric Warfare.*, P. 3
[19] DOD. *The Implementation of Network-Centric Warfare.* (Washington: U.S. Government Printing Office, 2005.) P. 7
[20] DOD. *The Implementation of Network-Centric Warfare.*, P. 15
[21] DOD. *The Implementation of Network-Centric Warfare.*, P. 18

is so great, that it will become a central aspect of the U.S. Military's transformation in organization and doctrine for future warfighting.

As NCW is so closely aligned with the emerging new technologies of the Information Age, some believe that these technologies alone will provide this combat advantage. However the proponents of NCW see these as merely enablers and the real potential of NCW stems from the innovative application of these technologies to the concept of effects-based operations (EBO) in a new way that will be both more precise and dynamic. "That is, the purpose of each new technology and concept is a reduction in the relative amount of military or other power needed to undertake a given mission, to fulfill a given task, or to create a specific outcome. The attraction of Network Centric Warfare and effects-based warfare is the prospect that they can yield improved combat efficiency."[22] The NCW proponents therefore draw the conclusion that in the future, military forces will be much lighter and smaller due to the advances in precision weaponry, and that high speed decision making will enable these forces to gain an asymmetric advantage over an opponent.

By applying NCW technologies with EBO, three distinct levels of potential improvement in combat efficiency begin to emerge. "The first level of improvement would derive from the application of new technologies to existing forces, doctrine, tactics, and organization and the existing concepts of warfare. The second level of improvement would derive from the adaptation of doctrine, tactics, and organization to optimize the impact of the new technologies. Finally, the third level of improvement in combat efficiency would then derive from the application of the

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[22]Edward A. Smith. *Effects Based Operations – Applying Network Centric Warfare in Peace, Crisis and War.* (Washington D.C.: DoD Command and Control Research Program, 2002.) PP. 63-64

new technology and thinking to a different style of warfare".[23] If the proponents were to achieve the third level of improvement it would be a move away from an attritional based approach whereby we continue to engage the enemy with kinetic means, but "to foreshorten the combat itself by breaking the enemies' will to resist, even though they may retain the forces and capabilities to do so."[24] It is by achieving this third level of improvement that the NCW proponents believe that the theory will move from the tactical level of warfare and become equally applicable at the operational and strategic levels.

The last perceived advantage of NCW is the ability to flatten the command and control structure of future military forces, and move towards the concept of self-synchronization. NCW theorists argue that current command and control of military organizations developed since the time of Napoleon to reduce the uncertainty of warfare for subordinates. "Thus, in order to avoid blunders and to marshal mass, deliberate centralized planning became the mainstay of military operations."[25] This method of command and control is seen as too cumbersome for the efficient conduct of NCW, and Cerbrowski argued that instead, "Greater speed of command means greater automation of some warfare activities, and a flatter organizational structure, given that direct access to the information needed to make decisions will be available. Command and control, in this scheme, will largely be conducted on the basis of negation."[26] The danger of the flattening of command structures is the loss of cognitive tension between the practitioners of combat at the tactical level, and the decision making at the strategic level. In effect this flattening of structures

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[23] Smith. *Effects Based Operations – Applying Network Centric Warfare in Peace, Crisis and War.* P. 64
[24] Smith. *Effects Based Operations – Applying Network Centric Warfare in Peace, Crisis and War.* P. 97
[25] Alberts, Garstka, Hayes, and Signori. *Understanding Information Age Warfare.* PP. 297-298
[26] Cebrowski. *Network-Centric Warfare: An Emerging Response to the Information Age.*, P. 18

may make the operational level of warfare irrelevant. The danger to militaries of losing

'Operational Art' is clearly identified by Shimon Naveh in his study *In Pursuit of Military*

Excellence – The evolution of operational theory.[27]

Critique of NCW Theory

Many military authors are critical of the significance of NCW to the future operations of

military forces. Even the major proponents of NCW are careful to identify and attempt to nullify

the criticisms that have been raised about NCW. Admiral Cerbrowski identified six

misconceptions of NCW that he believes form the basis of the criticisms of NCW: NCW drives

adversaries to asymmetric responses; Information systems are inherently vulnerable; NCW will

result in information overload; NCW leads to hasty, ill-considered actions because of its emphasis

on speed; Sister services and allies will not be able to operate effectively with NCW-capable

forces; and, NCW focuses only on the high end of the warfare spectrum.[28] While he offered

evidence to refute these criticisms, a variety of authors have highlighted the potential difficulties

of embracing NCW, and the negative effects that a force optimized for NCW may encounter on

future operations.

Thomas Barnett offers a note of caution to the U.S. military as to the future of NCW, by

playing devils advocate and discussing NCW's seven deadly sins of lust, sloth, avarice, pride,

anger, envy and gluttony. His concerns are similar to those identified by Cerbrowski, although he

believes that these difficulties can be resolved, "As with any transgression, penance can be

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[27] Shimon Nevah. *In Pursuit of Military Excellence: The Evolution of Operational Theory.* (UK: Frank Cass Publishers, 1997)

[28] Cebrowski. *Network-Centric Warfare: An Emerging Response to the Information Age.*, P. 20

made."[29] Barnett offered a pragmatic view as to the role of NCW in future combat. He sees that certain advantage can be gained through leveraging technology against future adversaries through a network enabled force, but he does not believe that NCW should be the central concept for the conduct of future conflicts. His thoughts were well summarized in his conclusion, where he stated that "To the extent that NCW marries the military to a networking paradigm, it moves America's defense establishment toward a future I view as inevitable."[30]

Major General Robert H. Scales JR., a former Commandant of the U.S. Army War College, has written various articles critiquing the future of warfare in what he described as the precision age. Using the US experience gained from the Kosovo Campaign, General Scales argued in particular that the Information Age is neutral, and that it in fact may favor the competition. Writing before the attacks of 11 September 2001, he stated that "The result may be a technology foot race that either side could win. As we develop the technologies to find and kill the enemy, our potential opponents will develop the technologies to become even more difficult to find."[31] General Scales also highlighted the information overload challenge as a crucial by-product of the information age, and believes that "A thinking opponent will quickly realize that our intensive reliance on information age technologies becomes a weakness that can become an asymmetric target."[32]

Another critic of the centrality of information dominance to future warfare is Colonel H.R. McMaster, who details his concerns in his monograph, *Crack in the Foundation: Defense*

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[29] Thomas P.M Barnett. The Seven Deadly Sins of Network-Centric Warfare. (*U.S. Naval Institute Proceedings.* Vol. 125 Issue 1: 36-40, 1999.) P. 36
[30] Barnett. *The Seven Deadly Sins of Network-Centric Warfare*, P.40
[31] Robert H. Jr. Scales. *America's Army in Transition: Preparing for War in the Precision Age.* (Carlisle: U.S. Army War College, 1999.) P. 12
[32] Scales. *America's Army in Transition: Preparing for War in the Precision Age.* P.12

Transformation and the Underlying Assumption of Dominant Knowledge in Future War.[33]

McMaster argued that many of the initiatives that the Department of Defense is pursuing as part

of Transformation are long overdue, and that the possibilities associated with emerging

technologies are significant, however he strongly believes that "The intellectual foundation for

building tomorrow's military force rests on the unfounded assumption that technologies emerging

from the 'information revolution' will lift the fog of war and permit U.S. forces to achieve a very

high degree of certainty in future military operations."[34] McMaster further argued that the

proponents of NCW suffer from *Hubris*.

> Hubris is an ancient Greek term defined as extreme pride that leads to
> overconfidence and often results in misfortune. In Greek tragedies, the hero vainly
> attempts to transcend human limits and often ignores warnings that portend a disastrous
> fate. The idea of dominant knowledge in war and the related overconfidence in so called
> 'shock and awe' precision strikes transcends the limits of the nature of war and, in
> particular, war's human dimension. Hubris permeates the language of defense
> transformation and is particularly evident in the reductive fallacies of information
> superiority, dominant battlespace knowledge, and their various companion terms.[35]

> Naval Commander John P. Springett II in his article, *Network Centric War without Art*,

argued that the advocates of NCW are only the last in a long line of theorists who believe the

concept that war is essentially a scientific endeavor. He stated that:

> This modern version of rational conflict concludes that a networked combination
> of pervasive sensors, a godlike vision of the battle space, and long-range
> precision weapons will enable U.S. military forces to be the most effective on
> earth. This vision is compelling, yet it is hampered by a failure to recognize the
> true strengths of the US military: the highly trained officers and enlisted

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[33] Herbert, R . McMaster. *Crack in the Foundation: Defense Transformation and the Underlying Assumption of Dominant Knowledge in Future War.* (Carlisle: U.S. Army War College, 2003.)

[34] McMaster. *Crack in the Foundation: Defense Transformation and the Underlying Assumption of Dominant Knowledge in Future War.* P.1.

[35] McMaster. *Crack in the Foundation: Defense Transformation and the Underlying Assumption of Dominant Knowledge in Future War.* PP. 27-28.

personnel who populate the ranks, their ability to innovate, and the leadership skills encouraged throughout the force.[36]

Springett further argued that the core concepts of NCW involving universal connectivity and information distribution are sound, but that the NCW proponents may morph the concept into a technological warfare management system. Springett sees three threats to existing U.S. military structures if this were to occur: the belief that war can be conducted in a scientific manner ignoring the human component and art of war; the flattening of command structures which short circuit the strategic, operational and tactical levels of war; and, a dangerous trend toward centralized control and execution.[37]

Milan Vego offers a similar critique of both NCW and EBO, by arguing that the scientific approach to warfare does not accept the importance of the military art factor. He states that "Effects-based operations (EBO) are a spin-off of network-centric warfare (NCW). Hence many of its premises are largely unproven, if not outright false. EBO and NCW proponents essentially see war as a business. They do not share the Clausewitzian view of the nature of war and have also embraced a deeply flawed systems approach for assessing situations and identifying centers of gravity."[38] Vego further argues that NCW and EBO are the antithesis of operational thinking towards warfare, although they use operational terminology as "ornaments rather than in ways that articulate their true meaning."[39]

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[36] John P. Springett II. Network Centric War without Art. (*U.S. Naval Institute Proceedings.* Vol. 130, Issue 2: 58-61, 2004.) P. 58

[37] Springett II. Network Centric War without Art. (*U.S. Naval Institute Proceedings.* Vol. 130, Issue 2: 58-61, 2004.) P. 58

[38] Milan Vego. Effects-Based Operations: A Critique. (*Joint Force Quarterly.* Issue 41, 2nd quarter: 51-57, 2006) P.51

[39] Vego. *Effects-Based Operations: A Critique*. P. 51

An Australian perspective of the potential and pitfalls of NCW was captured by Doug Richardson, in his article *Network Centric Warfare: Revolution or Passing Fad?*[40] In this article he quotes Aldo Borgu, the Program Director Operations and Capability at the Australian Strategic Policy Institute, who was unconvinced by the NCW argument. He states that "Iraq demonstrates that in the current guerrilla war that the US faces, technology and information is no substitute to having the adequate numbers of boots on the ground. Running the war on the cheap might be fine for the conventional phase but it ultimately ensures that you are not adequately prepared for the post war phase with all its particular challenges."[41] Borgu then argued that in the Australian context "We shouldn't kid ourselves that a networked company-sized group of soldiers has the same capabilities as a good old-fashioned -- but unfashionable – battalion of infantry, or a networked battalion the same capabilities as a legacy brigade and so on." [42]

A common thread throughout the critiques of NCW is recognition that information age technology will provide military advantage for future military forces. However they question whether this technology will become the dominant element within the conduct of future warfare. Many argue that a network enabled force may well have an advantage over an industrial age forces, but due to the human dimension, warfare will never become truly network-centric. Another reoccurring theme is whether NCW represents a true revolution in the way we conduct warfare, or whether it is merely an evolution of technology that has developed from the earlier Industrial Revolution.

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[40] Doug Richardson. Network-Centric Warfare: Revolution or Passing Fad? (Armada International. Vol. 28, Issue 5: 62-72, 2004.)

[41] Richardson. Network-Centric Warfare: Revolution or Passing Fad? P.72
[42] Richardson. Network-Centric Warfare: Revolution or Passing Fad? P. 72

NCW – Military Revolution, Revolution in Military Affairs, or neither?

The supporters of NCW contend that the United States and its partners in the Western World are experiencing "a transition from the Industrial Age to the Information Age"[43] due to rapid technological change and that because of this change, "Network-centric warfare is an emerging theory of war in the Information Age."[44] Not all historians or military theorists support the contention that the Industrial Age has concluded and a new theory of war is required for the future. Geoffrey Parker in the Epilogue to *The Cambridge Illustrated History of Warfare* stated that "Despite continuing improvements in military technology, conventional forces seem likely to operate at much the same times and in many of the same places as before"[45]. Murray and Knox provide a similar warning that "they [US Armed Forces] must beware above all of substituting technology for strategy and of fielding superior weapons *platforms* rather than effective military *forces*."[46] Few military historians debate the potential benefits to military forces that leverage technology to gain a warfighting advantage, but they debate whether information technology represents a military revolution or an RMA.

Much of the critical analysis of NCW supports the thesis that NCW is neither a Military Revolution nor RMA as defined by Knox and Murray[47], but is instead a continued evolution of the same technology that provided an overwhelming victory against Iraqi forces in Operations Desert Storm and Iraqi Freedom. Murray and Knox contend that the last true RMA resulted from

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[43] DOD. *The Implementation of Network-Centric Warfare.*, P. 3.
[44] DOD. *The Implementation of Network-Centric Warfare.*, P. 3.
[45] Parker, G (Ed), *The Cambridge Illustrated History of Warfare*, (UK: Cambridge University Press, 2004) P.372.
[46] MacGregor Knox, and Williamson Murray, Ed. *The Dynamics of Military Revolution 1300-2050,* (NY: Cambridge University Press, 2003) P.194.
[47] Knox and MurrayEd. *The Dynamics of Military Revolution 1300-2050,* CH 1.

the integration of technology with "concepts and doctrine"[48] as captured in the Air-Land Battle framework, that contributed to these decisive victories. It could be further argued that the innovations that enabled coalition success in Operations Desert Storm and Iraqi Freedom are merely a continuation of the earlier military revolution that resulted from the effects of Western Industrialization.

While NCW provides the integration of evolutionary technology to make military operations more efficient, it is difficult to sustain an argument that it represents a complete military revolution. This does not mean that information technology may not be part of a larger and more encompassing revolution of the future. The Tofflers in their book, *War and Anti-War,* argued that we are indeed on the verge of a new revolution, but that this revolution is actually due to the increased linkages between knowledge, wealth and war. [49] They believe that no single factor alone would constitute a revolution, but an understanding of how increasingly inter-related these three factors will become in the twenty-first century is the key to understanding any future revolution. As such, NCW being technology based forms a piece of the potential revolution, but not the revolution itself. They argue that, "A military revolution, in the fullest sense, occurs only when a new civilization arises to challenge the old, when an entire society transforms itself, forcing its armed services to change at every level simultaneously—from technology and culture to organization, strategy, tactics, training, doctrine, and logistics. When this happens, the relationship of the military to the economy and society is transformed, and the military balance of power on earth is shattered."[50]

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[48] Knox and Murray, Ed. *The Dynamics of Military Revolution 1300-2050,* P.189.
[49] Alvin and Heidi Toffler, *War and Anti-War.* (Boston: Little, Brown and Company, 1993.)
[50] Toffler. *War and Anti-War.* P.32.

Section Conclusion

       This section has introduced the concept of Network Centric Warfare, by analyzing its central themes through the lens of its major proponents, before highlighting the potential military benefits to be gained by embracing a NCW approach to warfare. The section then critiqued the concept of NCW by examining the criticisms of the concept put forward by both military historians and theorists who have questioned the validity of the concept. The section concluded by presenting that NCW is a continued evolution of an earlier RMA, but may form some part of a future military revolution--but not as its central tenet.

NCW – THE SOUL OF JOMINI?

Introduction

Throughout history man has attempted to seek the essence of warfare so that it can be recorded and utilized to predict the outcome of future battles. Jomini is recognized as the most noted of these theorists, in that he attempted to reduce the concepts of Napoleonic warfare into simple principles of war that if followed by future commanders, would guarantee victory.[51] This was diametrically opposed by Clausewitz Kantian philosophic framework for war, which contends that due to the inherent nature of war, it cannot be predicted or controlled by man. The central concepts of NCW that have been embraced by its proponents are arguably based on a 'Jominian' belief that enhanced situational awareness will provide a "decisive warfighting advantage"[52], and ignores the unpredictable nature of war as expressed by Clausewitz.

The proponents of NCW have also attempted to reconcile the 'Jominian' concept of NCW which "generates increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, high tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization" with the unpredictable, violent nature of war and the moral dimension as expressed by Clausewitz.[53] Clausewitz argued that while maximum force is required to achieve victory, it must be in

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[51]Peter Paret (ed). Makers of Modern Strategy from Machiavelli to the Nuclear Age. (Princeton: Princeton University Press, 1986.) P.146.

[52] DOD. *The Implementation of Network-Centric Warfare.*, P. 3.

[53] DOD. *The Implementation of Network-Centric Warfare.*, P. 4.

combination with intellect. Clausewitz stated that, "The maximum use of force is in no way incompatible with the simultaneous use of the intellect."[54]

The section will then dispute any attempts by the proponents of NCW to marginalize the human element of war by attempting to reconcile the theoretical differences inherent between Jomini and Clausewitz in their praise of Network-Centric Warfare. Finally this section will demonstrate how NCW concepts do reinforce the work of Colonel John Boyd, USAF who produced the Observe, Orientate, Decide, and Act (OODA) Loop model, and provide a linkage to EBO.

Jomini – The Science of War

Jomini in his *Art of War* rejected the romantic attitude of his age, and influenced heavily by positivism and the renewed appreciation of the power of scientific investigation, attempted to reduce the art of war to formulaic statements that could be utilized for the education of others. [55] Central to Jomini's argument was that there were certain principles of war that had been valid throughout history, and were again demonstrated during the Napoleonic Wars. Jomini has therefore throughout time been criticized for being "committed to reductionism and prescription."[56] The main features of Jomini's theories of war were based in the scientific nature of their application. Jomini believed that war would be successful for those who follow his simple scientific truths. The Western World has been profoundly influenced by this concept of simple truths, and indeed many of them have been codified in the modern 'Principles of War' found in U.S. and Australian doctrine. Michael Handel argues in *Masters of War: Sun Tzu, Clausewitz and*

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[54] Clausewitz. *On War.* Princeton: Princeton University Press, 1989. (Edited and Translated by Howard, Michael. and Paret, Peter) P. 75.
[55] Antoine Jomini. *Art of War.* in *Roots of Strategy Book 2*.(PA: Stackpole Books, 1987.)
[56] Paret. (ed). Makers of Modern Strategy from Machiavelli to the Nuclear Age. P.172.

Jomini that this is a distorted view of Jomini's work. [57] He argued that Jomini recognizes the non-scientific nature of the conduct of war at the higher levels, but that he does demonstrate that war can be directed scientifically at the lower levels.

Jomini does however embrace the value of modern weapons technology, and suggests that in the future the weaponry of war is likely to become increasingly decisive. "Superiority of armament may increase the chances of success in war. It does not of itself gain battles, but it is a great element of success. The new inventions of the last twenty years seem to threaten a great revolution in army organization, armaments and tactics."[58] Jomini therefore captures the linkage between technological innovation and military organizations at the tactical and operational level. Michael Handel warns of the danger of this approach by Jomini by stating that "In the age of advanced technology, there is a proclivity to overestimate the role of weapons in war and, as a result, to undervalue the non-tangible dimensions of strategy and war."[59]

It would appear that the proponents of NCW are strongly influenced by the Jominian view of warfare. They too believe that the power of modern technology can be utilized to reduce war to its scientific essence, allowing a commander to make decisions based upon near perfect situational awareness. The adherents of NCW view war from an optimistic viewpoint, as they believe that technology will provide them with the ability to win battles at the tactical level through the combination of superior situational awareness and precision weaponry. This view of warfare misses two essential elements, the role of uncertainty in war and the difficulty of linking tactical success to strategic victory. The human element of warfare is also scarcely referred to by the proponents of NCW, the same criticism which is commonly applied to Jomini's view of war.

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[57] Micheal I. Handel. *Masters of War: Sun Tzu, Clausewitz, and Jomini.* (London: Frand Cass and CO. LTD., 1992.)

[58] Jomini. *Art of War.* in *Roots of Strategy Book 2*, P.452.

Whether NCW concepts hold Jominian principles at their heart is open for debate, however, they do appear to contradict much of the philosophical ideas of warfare as presented by Jomini's contemporary theorist--Carl Von Clausewitz.

NCW – The Anti-thesis of Clausewitz

Carl Von Clausewitz in his seminal work *On War*, focuses the reader on many of the inherent relationships of warfare that are scarcely mentioned by the proponents of NCW, namely: war's human and psychological dimensions, the interactions with an intelligent enemy, the political nature of war, and other sources of uncertainty that limit man's efforts to control war. Clausewitz appears to have had two main goals in his study of war, to logically analyze the essence of absolute war, or 'ideal war' as he describes it, and to understand war in the various forms that it actually takes in the real world including its social and political interactions. Peter Paret interprets the nature of Clausewitz' work as "Discussions of the nature of war in the abstract alternate with the application to real war of such analytic devices as the theory of purpose and means, of the major concepts of friction and genius, of propositions of lesser magnitude such as those concerning the relationship of attack to defense, and with detailed operational and tactical observations—all embedded in historical evidence."[60] This section will question whether NCW concepts are diametrically opposed to Clausewitz tripartite definition of war, which demonstrates that war is composed of, and exists in the realms of violence, chance and politics.

Clausewitz makes no apologies for the true nature of war—that violence is at its heart. "Kind hearted people might of course think there was some ingenious way to disarm or defeat an enemy without too much bloodshed, and might imagine this is the true goal of the art of war.

[59] Handel. *Masters of War: Sun Tzu, Clausewitz, and Jomini* , P.19.
[60] Paret (ed). *Makers of Modern Strategy from Machiavelli to the Nuclear Age*, PP. 198-199.

Pleasant as it sounds, it is a fallacy that must be exposed: war is such a dangerous business that the mistakes which come from kindness are the worst…This is how the matter should be seen. It would be futile—even wrong—to try to shut one's eyes to what war really is from sheer distress at its brutality."[61]

Clausewitz argued that war is an organized act of violence to compel the enemy to bend to our will, and that ignoring this simple truth will detract from a true understanding of warfare. Admiral Cerbrowski argued the opposite to Clausewitz, stating that "NCW represents an important new mental model of warfare that emphasizes outcomes, or effects. If the objective of the use of military force is to encourage or force the adversary to change his mind, then the key effect sought is not destruction per se, nor is it to degrade the adversary's military capability. Rather, the goal is *neutralization*."[62] While Clausewitz recognized that actual war would not meet the violent extremes of his version of ideal war, he believed that violence was equally applicable to both models. The minimization of the physical aspect of warfare by the proponents of NCW is indeed the anti-thesis of Clausewitz understanding of continued necessity to utilize violence in the pursuit of warfare.

The second aspect of warfare that is examined by Clausewitz is the concept of uncertainty in warfare. Clausewitz sees that uncertainty or chance can only be understood by investigating the physical and psychological aspects of friction and genius that combat uncertainty in warfare. "Just as theory must not ignore imponderables and the singularity of events, 'which distinguish real war from war on paper', so theory must address the often unquantifiable forces that combat friction: the intellectual and psychological strengths of the

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[61] Clausewitz. *On War.* Princeton: Princeton University Press, 1989, bk. 1, ch.1, PP. 75-76.
[62] Cebrowski. *Network-Centric Warfare: An Emerging Response to the Information Age.*, P.17.

commander and of his subordinates; the morale, spirit, and self-confidence of the army; and

certain temporary and permanent traits of society as reflected in its soldiers—enthusiasm for the

war, political loyalty, energy."[63] It is this inherent unpredictability of warfare that the proponents

of NCW believe can be removed by utilizing advanced technology to improve understanding and

an effects-based approach to prosecute tactical actions. This concept is also antithetical to

Clausewitz view of warfare.

Friction is one of the concepts that Clausewitz believes separates warfare from other

human endeavors. He states "Everything in war is very simple, but the simplest thing is difficult.

The difficulties accumulate and end by producing a kind of friction that is inconceivable unless

one has experienced war…Friction is the only concept that more or less corresponds to the factors

that distinguish real war from war on paper."[64] Many of the proponents of NCW envisage a

seamless system which will link sensors and shooters through an information and knowledge

grid, effectively minimizing the friction that Clausewitz described. They utilize scientific

investigation and the experiences of the economic world to justify the utility of their beliefs.[65]

However McMaster supports Clausewitz assertions, and questioned the basis of these beliefs:

> Because experiments that are supposed to test assumptions of future war are
> biased toward validating concepts and because primary causes of uncertainty of
> war are absent from those experiments, joint and service experimentation
> actually advance a flawed intellectual foundation for Defense Transformation.
> Many of the advocates of near-certainty in future war have assumed that their
> experience and education as systems analysts, economists, computer scientists,
> engineers and business managers gives them not only valuable insight into, but a
> holistic understanding of war.[66]

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[63] Paret. (ed). Makers of Modern Strategy from Machiavelli to the Nuclear Age, PP. 203.

[64] Clausewitz. *On War.* Princeton: Princeton University Press, 1989, bk. 1, ch.1, P. 119.

[65] DOD Pamphlet, *The Implementation of Network-Centric Warfare*, P. 5.

[66] McMaster. *Crack in the Foundation: Defense Transformation and the Underlying Assumption of Dominant Knowledge in Future War.* P.58.

Equally the role of the military commander and the concept of 'genius' are not mentioned in the justifications of NCW. Genius speaks to the psychological aspect of warfare, where the commander imposes his will upon the battlefield, regardless of the difficulties that are posed through the friction of battle. Where NCW proposes that future forces will become 'self-synchronizing', Clausewitz sees the role of man as continuing to play a central role in battle. "Any complex activity, if it is to be carried on with any degree of virtuosity, calls for appropriate gifts of intellect and temperament. If they are outstanding and reveal themselves in exceptional achievements, their possessor is called a 'genius'."[67] The role of the commander remains central to the conduct of warfare at all levels for Clausewitz. The ability to recognize opportunities and to leverage advantage over a thinking enemy requires special skill for the commander, or what Clausewitz refers to by the French term—Coup d'oeil:

> Coup d'oeil therefore refers not alone to the physical but, more commonly, to the inward eye. The expression, like the quality itself, has certainly always been more applicable to tactics, but it must also have its place in strategy, since here as well quick decisions are often needed. Stripped of metaphor and of the restrictions imposed on it by the phrase, the concept merely refers to the quick recognition of a truth that the mind would ordinarily miss or would perceive only after long study and reflection.[68]

Clausewitz clearly recognized the role of the commander and genius in decision making, a concept that cannot be achieved through the self-synchronization of forces as proposed by the NCW proponents.

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[67] Clausewitz. *On War.* Princeton: Princeton University Press, 1989, bk. 1, ch.3, P. 100.
[68] Clausewitz. *On War.* Princeton: Princeton University Press, 1989, bk. 1, ch.3, P. 102.

Martin Van Creveld in the conclusion to his work *Command In War*, discusses the

competing efforts to cope with uncertainty between technology and traditional forms of

command. He stated:

> To make the same point differently, the most important conclusion of
> this study may be that there does not exist, nor has there existed, a technological
> determinism that governs the method to be selected for coping with uncertainty.
> At various periods in history, and in the face of any one set of requirements
> arising from the art of war as exercised in those periods, different military
> organizations, though making use of the same general communications and data
> processing technology, have approached the problem from radically different
> angles and with radically different results. There was nothing in the nature of any
> single technology, whether based on the signum or on the telephone, the
> messenger or the computer, to dictate which of the two solutions should be
> adopted.

> Far from determining the essence of command, then, communications
> and information processing technology merely constitutes one part of the general
> environment in which command operates. To allow that part to dictate the
> structure and functioning of command systems, as is sometimes done, is not
> merely to become the slave of technology but also to lose sight of what command
> is all about.[69]

Clausewitz in *On War* continually discusses the function and relationship of purpose,

objective and means that exist throughout all levels of warfare, from tactics through to strategy.

Clausewitz argues that the political element is less important at the tactical level, but that it is

always potentially present, as a tactical action can have political implications at the strategic

level. "From the struggle of a few soldiers to the clash of armies and the intellectual and

emotional battlefields of grand strategy and ultimate political decisions, the network of purpose,

objective, and means determines events, and should guide the thinking and behavior of the

antagonists."[70] Clausewitz clearly states that the strategic aim must guide tactical action, and not

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[69] Martin Van Creveld. *Command in War.* (Cambridge: Harvard University Press, 1985.) PP. 274-275

[70] Paret. (ed). Makers of Modern Strategy from Machiavelli to the Nuclear Age, PP. 207.

vice versa. The proponents of NCW, by arguing that technological advances will flatten the command structure of military forces, are therefore minimizing the value of operational art whereby this linkage between strategic aims and tactical action actually occurs.

Many critics of NCW do not see the linkage of the concepts from the tactical advantage that NCW may provide, to meeting the strategic endstate as directed by our political masters. They argue that NCW is actually more a 'strategy of tactics' and suggest that the wrong conclusions have been drawn from U.S. and Allied victories in the first Gulf War and more recently in Operations Enduring Freedom and Iraqi Freedom.[71] They instead show the limitations of technology to winning battles, not wars, and point to the U.S. involvement in Vietnam and the limitations of the Kosovo Air Campaign as limiters of the employment of technological solutions to achieving strategic success. Clausewitz himself states that "Strategic theory must therefore study the engagement in terms of its possible results and of the moral and psychological forces that largely determine its course."[72] NCW concepts fail to embrace the fact that 'moral and psychological' factors are the linkage between achieving tactical and operational success to strategic victory.

This comparison of NCW concepts against the key themes identified within Clausewitz *On War* has identified that NCW could be considered the anti-thesis of Clausewitz Kantian study of warfare, and are indeed more closely aligned to the Jominian scientific approach. NCW

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[71] See arguments in McMaster, Van Creveld, Scales, et.al.
[72] Clausewitz. *On War.* Princeton: Princeton University Press, 1989, bk. 3, ch.1, P. 177.

proponents also claim that the theory is supported by the work of Colonel John Boyd and his theory of the OODA loop, which provides a link from NCW to Effects-Based Operations.[73]

NCW and the OODA Loop

Many proponents of NCW and EBO have cited the compatibility of Colonel John Boyd's (USAF Retired) OODA loop theory of warfare with many of their technological based solutions for the future command and control of military operations. Boyd's easily understood diagrammatic model provides a simple construct for conflict and competition, and can easily be grasped by those who search for paradigms to deal with the complexity of modern military operations. A simplistic reading of Boyd's OODA model misses its underlying complexity, and Boyd's own repulsion of a technological approach to command and control, which he considered an extremely human domain. "This unique philosophy centers on C2 as a human rather than a technological endeavor. Boyd worried that the explosion of technology in the information revolution risks overshadowing the human dimensions of C2 in favor of hardware solutions. Consequently, he argues for a command and control system that focuses on what he calls the organic aspects of C2."[74]

Boyd developed his initial concepts relating to the OODA loop from his experiences as a fighter pilot during the Korean War. Boyd believed that the American Air Force Pilots' ability to observe, orient, decide and act facilitated from a situational awareness provided by the bubble shaped canopy of the F-86 Sabre, enabled them to defeat the superior Chinese MIG-15 pilots in aerial combat. Building on this insight during his retirement while absorbed with the study of

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[73] Edward A Smith. *Effects Based Operations – Applying Network Centric Warfare in Peace, Crisis and War.* (Washington D.C.: DoD Command and Control Research Program, 2002.) CH 3.
[74] Robert B Polk. A Critique of the Boyd Theory—Is it Relevant to the Army? *Defense Analysis.* Vol. 16, No. 3: 257-276, 2000. P. 263.

military theorists and history, Boyd developed a complex theory of warfare. The base line of this theory was developed in a document entitled *Destruction and Creation*. This document clearly focuses on the role of the mind and its perception of the environment as the center of this theory. Boyd stated that:

> To comprehend and cope with our environment we develop mental patterns or concepts of meaning. The purpose of this paper is to sketch out how we destroy and create these patterns to permit us to both shape and be shaped by a changing environment. In this sense, the discussion also literally shows why we cannot avoid this kind of activity if we intend to survive on our own terms. The activity is dialectic in nature generating both disorder and order that emerges as a changing and expanding universe of mental concepts matched to a changing and expanding universe of observed reality.[75]

Boyd did not publish any further of his work, instead producing a series of presentations that he called *Discourses on Winning and Losing.* After conducting these presentations widely throughout the military—also becoming the unofficial leader of a so-called post-Vietnam reform movement—Boyd's ideas were captured by William S. Lind in his guide for the US Marine Corps, *Maneuver Warfare Handbook*.[76] Lind codified Boyd's theory into his concept of maneuver warfare, but simplifies the theme to make it understandable for the younger Marine demographic that his handbook was designed for. Lind himself explains that "The briefing Colonel Boyd gives to explain his theory, 'Patterns of Conflict', takes over five hours. But, at the cost of missing some of the subtleties and the supporting historical evidence in the briefing, it can be summarized as follows. Conflict can be seen as time-competitive observation-orientation-decision-action cycles."[77]

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[75] John. R Boyd. *Destruction and Creation*. Leavenworth: USCGSC CTAC Course Special, 1976. P.1.

[76] William. S. Lind. *Maneuver Warfare Handbook*. Colorado: Westview Press, 1985.
[77] Lind. *Maneuver Warfare Handbook*. Colorado: Westview Press, 1985. P.5.

It is this simplified version of a complex theory that has become accepted by many

modern military theorists. "The OODA Loop is often seen as a simple one-dimensional cycle,

where one observes what the enemy is doing, becomes oriented to the enemy action, makes a

decision, and then takes an action. This 'dumbing down' of a highly complex concept is

especially prevalent in the military, where only the *explicit* part of the Loop is understood. The

military believes speed is the most important element of the cycle, that whoever can go through

the cycle the fastest will prevail. It is true that speed is crucial, but not the speed of simply cycling

the Loop. By simplifying the cycle in this way, the military can make computer models. But

computer models do not take into account the single most important part of the cycle—the

orientation phase, especially the *implicit* part of the orientation phase."[78] It is this desire to speed

action through the OODA process that is at the heart of NCW, and particularly with the concept

of self-synchronization. Smith in his book *Effects-Based Operations* stated that "To increase the

impact of network-centric-derived speed of command and thus combat efficiency, we must

accelerate both parts of the combat cycle, the OODA cycle and the process of generating combat

power."[79] It is the speed of action, not an understanding of the opponent's intentions, and then

true orientation of friendly actions that forms the basis of the NCW approach to warfare, and is

therefore at odds with the deeper meaning of Boyd's theories.

Robert Polk in his critique of the Boyd Theory provides a timely and succinct warning on

the continued misrepresentation of the Boyd theory by NCW proponents, "As the Army adapts to

the information revolution, the Boyd Theory also gets high marks for warning against relying on

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[78] Robert Coram. *Boyd—The Fighter Pilot Who Changed the Art of War.* Boston: Little, Brown and Company, 2002. PP. 334-335.

[79] Edward A. Smith. *Effects Based Operations – Applying Network Centric Warfare in Peace, Crisis and War.* Washington D.C.: DoD Command and Control Research Program, 2002. P.84.

hard data for solutions to military problems in what is essentially a human endeavor. Boyd's

emphasis on the human aspects of conflict and competition are often lost in the crowd of C4ISR.

The Army continues to believe that technology can tame uncertainty and that the future of

conflict lies more in the art of mastering the science of well-laid plans than in fighting the

opponent."[80]

Section Conclusion

The proponents of NCW take great pains to deny that NCW presupposes perfect

situational awareness, but that "Rather, the issue is how one creates and exploits an information

advantage within the context of the fog and friction of war."[81] By attempting to reconcile the

inherent uncertainty of war as examined by Clausewitz with centralized control and near perfect

situational awareness as proposed in NCW, the issue becomes confused. While this is not the first

US pamphlet that attempts to reconcile the inherent differences between Jomini and Clausewitz,

The Implementation of Network-Centric Warfare takes the argument one step too far by stating

that "while the classical strategic theories of war may require adaptation to a changing

environment such as we are experiencing in the Information Age and in the conduct of the Global

War on terror, they remain fundamentally intact."[82] This statement implies that the nature of war

in the Information Age is somehow different from that of previous wars that were studied by

military theorists such as Jomini and Clausewitz, and that their theories "may require

adaptation".[83]

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[80] Robert B. Polk. A Critique of the Boyd Theory—Is it Relevant to the Army? *Defense Analysis.* Vol. 16, No. 3: 257-276, 2000. P. 272.
[81] DOD Pamphlet, *The Implementation of Network-Centric Warfare*, P. 16
[82] DOD Pamphlet, *The Implementation of Network-Centric Warfare*, P. 16
[83] DOD Pamphlet, *The Implementation of Network-Centric Warfare*, P. 16

Human nature dictates that we prefer predictability over unpredictability. Therefore many commanders may feel inherently more comfortable with the predictable nature of warfare as detailed by Jomini. At the heart of NCW is the belief that technology will provide a degree of situational awareness that will remove the uncertainty of war, and once again make war predictable. Arguably, this is a fallacy that must be continually challenged. While NCW can provide a marked advantage to forces that harness its utility, it will neither remove the uncertainty of war, nor become a substitute for true strategic thinking.

THE LIMITATIONS OF TECHNOLOGICAL REVOLUTIONS – AIR POWER

Introduction

Mans age old dream of flight was truly achieved in 1903 when Orville and Wilbur Wright demonstrated a reliable heavier than air flying machine with their first successful flight at Kitty Hawk, North Carolina. The aircraft itself was not the most significant technological revolution, but the earlier invention of the internal combustion engine was arguably a true revolution of the Industrial Age, that enabled this flight. The aircraft rapidly captured the world's imagination, with the Great War of 1914 – 1918 demonstrating the military utility of the aircraft. The true proliferation of aircraft occurred after the Great War, with the development of the civil aviation industry that catered to a new market of passenger transportation, as well as for the delivery of airmail. The airline industry became a major source of both pilots and aircraft which could be utilized for future conflict.

Due to the perceived adventure of a career in aviation, the industry attracted a predominately younger demographic who were physically and mentally alert, but "pragmatically rather than philosophically inclined."[84] It was from this group who was passionately committed to the advancement of aviation and had also witnessed the horror of the First World War, who would generate theories about the future of air power. Goulio Douhet and William Mitchell were two of the main advocates of air power being the predominate instrument of future war and

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[84] Paret, Peter (ed). *Makers of Modern Strategy from Machiavelli to the Nuclear Age.* Princeton: Princeton University Press, 1986. P. 626.

"whose writings played a large part in the evolution from a simple faith in that doctrine to its use as the basis for theories of tactical employment of forces and the selection of objectives."[85]

This section will utilize the development of air power theory in the Twentieth Century as a case study as to the danger of overemphasizing the potential benefits of a technological revolution. The section will firstly examine the air power theories of Giulio Douhet and William Mitchell that were so influential in the Inter-War period, and how they viewed air power as revolutionizing future warfare. The section will then discuss the limitations of air power as it was applied during the Second World War, showing how through a process of evolution air power became integrated into a combined arms approach to warfare, but was not individually decisive as prophesized by its proponents. The section will conclude by discussing the parallels between the advocates of NCW and the air power theorists.

Air Power Theorists – Douhet and Mitchell.

Giulio Douhet was an Italian artillery officer who was born in 1869 and died in 1930. During his military career Douhet was an early advocate of motor transportation for the army, and as early as 1909 wrote of the importance of air power for future conflict.[86] He was court-martialed and jailed in 1916 after sending a highly critical memorandum to an Italian Cabinet member, although the charges were repudiated and expunged in 1920. In February 1918 he was recalled to service at the head of the Central Aeronautical Bureau, where he attained the rank of General in 1921 and commenced his serious writings on the potential strategic advantages that would be provided to nations that utilized air power.

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[85] Edward Warner. "Douhet, Mitchell, Seversky: Theories of Air Warfare." *Makers of Modern Strategy.* Edited by Edward Meade Earle, NJ: Princeton University Press, 1971. P. 626.

Douhet's theories were based on two underlying assumptions. The first was that aircraft were instruments of offense of incomparable potentialities, against which no effective defense could be foreseen. The second was that civilian morale would be shattered by bombardment of centers of population.[87] From these assumptions he developed a detailed theory which emphasized the psychological impact of air power upon civilian targets. Douhet emphasized that the primary objective of these attacks should not be military installations, but industries and centers of population remote from the surface forces. While not discussing the ethical implication of legitimizing the attack of civilian targets, he believed that warfare would be shortened through the use of air power, and that consequently casualties would be less than the war of attrition that the he had observed in the First World War. Douhet also advocated not only the use of explosive ordinance, but also incendiary and poison gas to achieve this psychological collapse of the enemy's population.

Douhet's belief in the offensive nature of air power, led him to advocate that the development of defensive air measures would be wasted resources. He believed that the enemy air force should not be engaged in aerial combat, but will be defeated by destruction of its ground installations and of the factories from which its supplies are produced. This meant that the fighting aircraft should be a "bombing plane" which could conduct bombing runs as part of the "unit of bombardment" while at the same time being able to conduct its own self protection. [88] It

[86] Warner. "Douhet, Mitchell, Seversky: Theories of Air Warfare." *Makers of Modern Strategy.* P. 627.

[87] Warner. "Douhet, Mitchell, Seversky: Theories of Air Warfare." *Makers of Modern Strategy.* P. 628.

[88] Giulio Douhet. *The Command of the Air*. NY: Arno Press, 1972, P. 38.

is interesting to note that Douhet viewed the aircrafts self defense weapons as only necessary for "the crew's morale".[89]

While Douhet recognizes that a surface army and navy would still be required for future warfare, he believed that they would play purely defensive roles, while the offensive form of warfare would be engaged by air power. Douhet summarized the meaning of 'command of the air' as:

> To have command of the air means to be in a position to wield offensive power so great it defies human imagination. It means to be able to cut an enemy's army and navy off from their bases of operation and nullify their chances of winning the war. It means complete protection of one's own country, the efficient operation of one's army and navy, and peace of mind to live and work in safety. In short, it means to be in a position to win. To be defeated in the air, on the other hand, is finally to be defeated and to be at the mercy of the enemy, with no chance at all of defending oneself, compelled to accept whatever terms he sees fit to dictate.
>
> This is the meaning of the "command of the air".[90]

The career of the American Billy Mitchell had many similarities to that of Douhet. Mitchell was born in 1879 to a privileged family in Nice, France. Mitchell's father became a US senator who supported his son's early military career, where he was commissioned at the age of eighteen as a second lieutenant in the Signals Corps. Mitchell demonstrated ample ability during assignments in the Philippines and Alaska, and at thirty-two was appointed to the Army General Staff. Mitchell paid for his own flying lessons in 1915, leading to his promotion as the deputy chief of the Signal Corps Aviation Section in 1916. He served in France in 1917 as a pilot during the final phases of the First World War.

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[89] Douhet. *The Command of the Air*. NY: Arno Press, 1972, P. 40.
[90] Douhet. *The Command of the Air*. NY: Arno Press, 1972, P. 22.

One of the more profound differences between Douhet and Mitchell was in temperament. Mitchell wrote and spoke with intense passion in support of air power, becoming both impatient with and provocative of those who disagreed with his theories. Douhet maintained an academic approach to his advocacy, letting his writing define his position. Mitchell was promoted to the rank of brigadier general in 1921 as assistant chief of air services after a postwar tour of the European states to study their status of aviation. It was during this period that Mitchell widely advocated, publicly and privately, the necessity of air power within the U.S. military organization, a position that created animosity with many senior military figures in the Army and Navy. His contention that aircraft could sink battleships led to a series of tests that ultimately validated the concept, arguably leading to the US Navy embracing the concept of aircraft carriers.

It was Mitchell's zealous advocacy of a unified air force, independent of either the Army or Navy that eventually led to his court martial ordered by President Coolidge in 1925. Mitchell was publicly criticizing the policies of the war and navy departments, when he "finally culminated in a statement which charged the war and navy departments with 'incompetence, criminal negligence, and almost treasonable administration of the national defense' and asserted that officers 'and agents sent by the War and Navy departments to Congress have almost always given incomplete, misleading, or false information about aeronautics.'"[91] Mitchell's trial lasted seven weeks, where much of the discussion was in relation to Mitchell's concepts of air power, not of his conduct. Mitchell was found guilty and sentenced to suspension of rank, command, and duty, with forfeiture of all pay and allowances for five years. The sentence was later reduced to

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[91] Warner. "Douhet, Mitchell, Seversky: Theories of Air Warfare." *Makers of Modern Strategy.* P. 628.

forfeiture of half his pay, which Mitchell refused, instead resigning on February 1, 1926.[92]

Mitchell devoted the remainder of his life to advocating the cause of a unified air force and to

denounce the direction of the US aeronautical and aircraft industry, which he believed to be

retarding technical development.

Unlike Douhet, Mitchell never advocated that future air power would rely on a single all-

purpose airplane. As Mitchell had personally experienced command of air forces in battle, he

brought a more tactical understanding to his theories of aerial warfare. While Mitchell was

congruent with Douhet on the possibility of defeating an enemy's will through strategic bombing,

he also believed that an aerial attack could be beaten in an air battle. In this respect, Mitchell may

have had a clearer understanding of the future of aerial warfare that was to be observed during the

Second World War.

Reality of Air Power – Did it make surface warfare obsolete?

The translation of the works of Douhet and Mitchell into doctrine for air warfare had far

reaching results for both the United States and Britain as they developed their air capabilities for

the Second World War. The emergent theme on both sides of the Atlantic was faith in the

survivability of the bomber to reach its targets to create a decisive strategic effect. This approach

was flawed, and as indicated by Max Boot in *War Made New*, it was not through strategic

bombing that the aircraft proved its utility, but that "Aircraft as a component of ground and sea

warfare proved indispensable, and victory often went to whichever side was more adept at

integrating them into its operations."[93] It was the slow institutional realization that pre-war

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[92] Warner. "Douhet, Mitchell, Seversky: Theories of Air Warfare." *Makers of Modern Strategy.* P. 628.
[93] Max Boot. *War Made New – Technology, Warfare, and the History - 1500 to Today.* NY: Penguin Group (USA) Inc, 2006. P.297.

theories were incorrect that led to an aerial war of attrition against the cities of Germany and Japan and cost countless allied airman lives, before a recognition by air power proponents that aerial superiority must be achieved before effective strategic bombing could be conducted.

The principle theme of the British Royal Air Force (RAF) development between the wars stressed the importance of independent air operations. They wished to avoid a repetition of the slaughter of the First World War, and viewed air attacks aimed at the sources of the enemy's strength to produce a swift and more humane decision. "The RAF refused to study the last war; its principle leaders shared a messianic belief that technology had rendered all previous experience obsolete, and they framed their force structures, doctrine, and employment concepts in the light of technological changes that had yet to occur. That approach had a disastrous impact on the British strategic bombing campaign during much of the Second World War."[94] The decision in 1936-1937 to switch the emphasis of resources of the RAF from Bomber Command to Fighter Command came just in time to prepare defenses for the Battle of Britain.[95]

In the United States, the U.S. Army's Air Corps Tactical School developed Douhet and Mitchell's broad concepts and developed a detailed doctrine of employment for operations against the enemy's industrial web. Some instructors believed that it would be possible to single out particular targets "whose destruction would of itself bring to a halt an entire industry or series of industries."[96] The new B-17 had the range, speed, altitude and bomb carrying capacity to conduct this style of attack, and married with the Norden Mark XV bombsight, it was envisioned that a large bomber fleet could take off from a base, fly above the air defense, and conduct

[94] Knox and Murray. *The Dynamics of Military Revolution 1300-2050.* Cambridge: Cambridge University Press, 2003. PP.182-183.
[95] Paret. (ed). *Makers of Modern Strategy from Machiavelli to the Nuclear Age*. P. 633.
[96] Paret. (ed). *Makers of Modern Strategy from Machiavelli to the Nuclear Age*. P. 634.

precision bombing of targets. These bombing fleets would be self-defending, as long-range escort

fighters had yet to be designed. This provided the basis of the U.S. theory of daylight, high

altitude, and precision bombardment of selected targets.

Murray and Knox conclude that a proclivity to disregard the present situation as well as

past evidence in both the RAF and U.S. Army Air Force led to near disaster:

> RAF belief that the bomber—in Stanley Baldwin's long-remembered but wholly
> misleading words—"would always get through" led to a dramatic failure to
> realize the full potential of strategic bombing until late in the war. Both British
> and American services ignored the powerful defensive lessons of the Battle of
> Britain in favor of their pre-war doctrinal fantasies.[97]

It was not until the deployment of the P-51 Mustang as a bomber escort long range fighter, that

U.S. daylight operations could begin to effectively erode German industry to the point that it

could have an operational effect upon the German military apparatus.[98]

David MacIsaac in Makers of Modern Strategy identifies many of the shortcomings of

the air power theorists during the Second World War. These include:

> (1) the unstated assumption that precise intelligence regarding enemy targets
> would be available; (2) a prevailing tendency to magnify expected capabilities
> derived from designs still on drawing boards, at the same time minimizing the
> likely effects of limiting factors—not the least of which would prove to be the
> impact of weather conditions on flying operations; (3) a pattern of looking at the
> parts of the problem at the expense of the whole, a form of reductionism surely
> not limited to air theorists, but one leading to a concentration on means rather
> than ends, running parallel with a tendency to confuse destruction with control,
> and at the same time reducing strategy to a targeting problem; and (4) a gross
> over-estimate of the self-defending capacity of bomber aircraft against a daring
> and dedicated defending air force.[99]

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[97] Knox and Murray. *The Dynamics of Military Revolution 1300-2050.* P.184.
[98] Boot, Max. *War Made New – Technology, Warfare, and the History - 1500 to Today*. P. 277
[99] Paret (ed). *Makers of Modern Strategy from Machiavelli to the Nuclear Age.* P. 635.

Section Conclusion

Murray and Knox in *The Dynamics of Military Revolution* suggest that the failure of strategic bombing to prove decisive in the Second World War is an example of a failure to integrate a technological advancement within a historical and contextual framework of the organization. Instead of recognizing technological advances as a means to conduct evolutionary adaptation of the organization, air power theorists argued that the innovation made current organizations and processes obsolete. Murray and Knox stated that the Combined Bomber Offensive played a vital role in winning the Second World War, "But the infatuation of the British and U.S. air leadership with technological assumptions that contradicted both past experience and current operational-tactical realities raised immeasurably the cost of victory in aircraft and lives."[100]

The proponents of NCW argue that a transforming military must embrace NCW as a central concept, requiring the development of new operational concepts, organizational structures and relationships.[101] The U.S. DOD Office of Force Transformation stated that "The ongoing shift from platform-centric to network-centric thinking and NCW is key to force transformation and an evolving approach to the conduct of joint warfare in the Information Age."[102] Current force planners should exercise caution, by comparing the perceived decisive 'strategic' advantage that the air power theorists of the inter-war period advocated, against current NCW proponents who believe that NCW will provide a "decisive warfighting advantage".[103]

Murray and Knox again offer a final note of caution as to over reliance upon technological innovations for future force planning. They instead emphasize the importance of

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[100] Knox and Murray. *The Dynamics of Military Revolution 1300-2050.* P.184.
[101] US DOD Pamphlet, *The Implementation of Network-Centric Warfare,* P.6.
[102] US DOD Pamphlet, *The Implementation of Network-Centric Warfare,* P.6.

adopting an evolutionary approach to perceived revolutions in military affairs. "Revolutions in military affairs despite their name in fact consist primarily of evolutionary peacetime changes through which military organizations alter their conceptual picture of future war in response to technological change. The resulting adaptation of concepts and doctrine results in gradual systemic alterations to how organizations fight."[104] The next section will examine how the Australian Army is adopting an evolutionary approach to implementing NCW concepts, as opposed to the U.S. DOD Office of Force Transformation which advocates the revolutionary aspect of NCW to future conflict.

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[103] US DOD Pamphlet, *The Implementation of Network-Centric Warfare,* P.3
[104] Knox and Murray. *The Dynamics of Military Revolution 1300-2050.* P.185

NETWORK ENABLED VERSUS NETWORK CENTRIC—A DIFFERENT APPROACH?

Introduction

Due to the complexities of the current operational environment and the demands on the Australian Army to provide land forces for operations within its region and throughout the world, the Australian Army fundamentally reviewed its organizational basis. While the Army faces a period of high operational tempo, it remains constrained as to the size of the land force by the Government's strategic guidance and budgetary restraints. To provide the best possible land force to support the Government's strategic guidance and foreign policy initiatives, the Australian Army has embraced the Hardened and Networked Army (HNA) concept as the means to conduct force transformation to remain both relevant and ready for future combat or peace support operations in the future.

To understand the implications of HNA to the future Australian Army, it is necessary to examine the paradigm shift in Australian Strategic Guidance that has occurred in the past decade. The strategic guidance has removed the constraints from an Army primarily designed and equipped for the defense of the Australian mainland, to an Army that is a balanced component of the joint force that can conduct expeditionary operations in both our immediate region or in support of coalition operations throughout the world. To support this paradigm shift, the Army has developed a new Future Land Operational Concept (FLOC) entitled *Complex Warfighting*. The Land Force has further developed an integrated response to the FLOC—*Adaptive Campaigning*—which describes the Land Force's contribution to a Whole of Government response to resolving conflict. These two documents provide context for the HNA initiative, and particularly for the Australian approach to NCW concepts.

This final section will discuss the development of the Australian "network enabled" concept for the employment of NCW concepts, by considering Australia's strategic environment, and how it has influenced the Australian Army's transformational HNA initiative.[105] This section will then discuss why the network enabled concept forms the second pillar of the HNA concept, and why it presents a pragmatic evolutionary response to an emerging technological advance, rather than a radical revolution as advocated by many NCW proponents. The section will finally discuss how this network enabled approach is significantly different from both the Australian Defence Force (ADF) and the U.S. DOD vision for NCW.

Australian Strategic Context

The strategic tasks which the government requires the ADF to be prepared to conduct are detailed in the 2000 Defense White Paper, *Defending Australia*. This document, along with Defense Security Updates in 2003 and 2005, clearly enunciated that the defense of Australia and contributing to the security of our region and further abroad were essentially related elements of the same task. The White Paper authorized the development of an expeditionary offshore capability for the Army, meaning in the words of the Chief of Army Lieutenant General Leahy that "The development of our land forces needs to reflect a new balance between the demands of operations on Australian territory and the demands of deployments offshore, especially in our immediate neighborhood."[106] An examination of the Australian deployment to East Timor in 1999 concluded that the Australian Army was structured and equipped primarily for the defense

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[105] Australian Army. *The Hardened and Networked Army.* Available from the internet at www.defence.gov.au., P.6.
[106] Peter Leahy. A Land Force for the Future. *Australian Army Journal,* Vol. 1, No.1: 19-28, 2004. P.22.

of continental Australia. This Army structure no longer provided the strategic responsiveness necessary for the operating environment.

Prior to the 2000 Defense White Paper, strategic guidance stated that the Army would develop its force structure primarily for the defense of the Australian homeland. This guidance provided a force structure and guidance that often conflicted with the strategic realities faced by the Army during the 1990s, including offshore deployments to Somalia, Cambodia, Rwanda, Bougainville and East Timor. General Leahy described the effect of this guidance on the Australian Army as "We gradually lost strategic agility; our units became hollow; our ability to operate away from Australian support bases declined to a dangerous degree. Moreover, our capacity to generate, sustain and rotate forces in the field diminished alarmingly."[107]

To support the strategic paradigm shift provided by the 2000 Defense White Paper, the government provided additional funding in the Defense Capability Plan to provide new equipment for the ADF in support of the amended guidance. While the ADF was implementing these changes, the 11 September 2001 attacks against the U.S. heralded a new strategic era for Australia and the world. In February 2003, the Australian Government's Annual Strategic Review emphasized the increased lethality and reach of non-state actors and their effect upon the security of Australia. The September 11 attacks demonstrated conclusively that no country or people is safe from terrorist aggression, and re-emphasized the importance of strategic reach and responsiveness in fighting this threat.

The Australian Army has responded to this challenge to increase its strategic reach and provide more responsive forces by developing the FLOC, *Complex Warfighting*. The FLOC

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[107] Leahy. A Land Force for the Future. *Australian Army Journal,* Vol. 1, No.1: 19-28, 2004. P.23.

analyzed the environment of contemporary conflict, to determine how the land force would need

to operate in order to succeed in both contemporary and future operations. The FLOC identified

that due to globalization, the contemporary operating environment is more complex, diverse,

diffuse and highly lethal. "Although some elements in the environment are new, there are

continuities between previous forms of warfare and the types of conflict now emerging. These

represent long-standing trends within warfare—complexity, diversity, diffusion and lethality.

Globalization and technological progress have caused these long-standing trends to interact in a

mutually reinforcing, real-time fashion."[108] The FLOC identifies that to operate in this

environment land forces require versatility, agility and the ability to orchestrate effects in a

precise and discriminating fashion. "This demands modular, highly educated and skilled forces

with a capacity for network-enabled operations, optimized for close combat in combined arms

teams."[109]

Further developing the theme of future force requirements, the Australian Army has

produced a draft version of its response to the FLOC, entitled *Adaptive Campaigning*. This paper

provides further intellectual validity to the twin themes of the Australian Army's transformational

objectives of HNA, the ability for the force to conduct close combat with an enemy, and the

importance of information dominance in the future. *Adaptive Campaigning* states that:

> The norm in complex warfighting will be for land forces to fight for and not with
> information. As a result, land force actions will be characterized by the high
> levels of adaptability described in the Adaptation cycle (Act-Sense-Decide-
> Adapt). The paper accepts that regardless of technological advances, reducing
> force density on the battlefield and improvements in communications, the ability

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[108] Australian Army. *Complex Warfighting.* Available from the internet at www.defence.gov.au.
P.4.

[109] Australian Army. *Complex Warfighting.* Available from the internet at www.defence.gov.au.
P.1.

to conduct sustained close combat in close proximity to the enemy and the population is critical.[110]

The Hardened and Networked Army

As current operations in both Iraq and Afghanistan have demonstrated, the future enemy will rarely challenge coalition military power directly, but will increasingly utilize asymmetric approaches to warfare. The enemy will therefore likely operate as smaller groups, utilizing off of the shelf military technology such as hand-held anti-armored and anti-aircraft weapons or improvised explosive devices to inflict casualties upon coalition forces. These attacks will seldom be designed to defeat our forces directly, but to cause attrition upon them, in an attempt to undermine public support for the conflict. Within South Asia, Australia's immediate region there has bee an increase in the development and purchase of Short Range Anti-Armored weapons that provide increased lethality for a small determined enemy.[111] Under HNA, the Australian Army will increase in size and reshape its forces to better face future challenges and to make the most of the acquisition of new equipment, as part of a ten year plan that commenced in 2006.[112]

One of the key elements of the HNA plan was the recognition that the Australian Army required additional combat weight and transition from a light infantry force to a light armored force. While the 2000 Defense White Paper clearly ruled out increasing the number of heavy armored regiments designed for high intensity conflict, it did state that Australian forces must be equipped with the necessary combat weight to safely conduct full spectrum operations. The legacy tank system employed by the Army, the Leopard AS1 was considered to not provide

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[110] Australian Army. *Adaptive Campaigning-The Land Force Integrated Response to Complex Warfighting (Draft).* Available from the internet at www.defence.gov.au. P.1.

[111] Australian Army. *Complex Warfighting.* Available from the internet at www.defence.gov.au. P.P. 10-12.

[112] Australian Army. *The Hardened and Networked Army – Networking.* Available from the internet at www.defence.gov.au., P.4.

adequate crew protection or sufficient lethality to support combined arms operations in the current operational environment. After the Army compared available tank replacements, the Australian Government approved the purchase of the M1A1 Abrams Armored Improved Model (AIM) to provide a tank with sufficient combat weight to form a central element of future combined arms teams. Additionally the Army would be reorganized to provide armored mobility and protection of varying degrees for all soldiers on the battlefield, utilizing a variety of planned in-service light armored vehicles.

Another significant aspect of the HNA plan was for the army to become a truly 'network enabled' force that would improve its communications networks to ensure the rapid transfer of information across the battlefield.[113] The Australian Army has accepted the prospect that NCW concepts will significantly enhance the integration, responsiveness and effectiveness of joint forces in Complex Warfighting.[114] However the authors of HNA do not envisage NCW forming the central element of future warfighting concepts, instead acknowledging that "NCW enhances combat power" and that "the concept is built upon the foundations of mission command, professional mastery and shared situational awareness."[115] The recognition that the network enabled approach retains the centrality of the human dimension of warfare, brings the Australian Army's vision of NCW more in line with Clausewitz's theories of warfare.

The Australian Army plans to implement the network enabled force, by developing a Federated Network, Supporting Communications and Information Systems, Networked Fires and

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[113] Australian Army. *The Hardened and Networked Army.* Available from the internet at www.defence.gov.au. P.6.
[114] Australian Army. *The Hardened and Networked Army – Networking.* Available from the internet at www.defence.gov.au., P.1.
[115] Australian Army. *The Hardened and Networked Army – Networking.* Available from the internet at www.defence.gov.au., P.1.

Intelligence, Surveillance, and Target Acquisition and Reconnaissance (ISTAR).[116] The Federated Network would provide the Australian Army the ability to share situational awareness across a deployed force as well as supporting joint assets and coalition allies, through the provision of an upper and lower tactical intranet. The Supporting Communications and Information Systems are those digital communications systems that will provide the backbone for these networks. Networked Fires will provide combined arms teams the ability to conduct tactical engagements from indirect or air based joint and coalition assets that are within range. Finally the ISTAR systems will provide battlefield information by performing the "find, inform and stimulate effect" further enhancing the Federated Network.[117] The Australian Army assesses that by embracing these elements to achieve a network enabled army, that it allows the land force to conduct EBO in a Complex Warfighting environment.

Network Enabled Versus Network Centric

The authors of *The Implementation of Network-Centric Warfare* contend that the United States and its partners in the Western World are experiencing "a transition from the Industrial Age to the Information Age" due to rapid technological change and that because of this change, "Network-centric warfare is an emerging theory of war in the Information Age."[118] Not all historians or military theorists support the contention that the Industrial Age has concluded and a new theory of war is required for the future. Geoffrey Parker in the Epilogue to *The Cambridge Illustrated History of Warfare* states that "Despite continuing improvements in military

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[116] Australian Army. *The Hardened and Networked Army – Networking.* Available from the internet at www.defence.gov.au., P.P. 2-4.
[117] Australian Army. *The Hardened and Networked Army – Networking.* Available from the internet at www.defence.gov.au., P.P. 3-4.

[118] US DOD Pamphlet, *The Implementation of Network-Centric Warfare,* P.3

technology, conventional forces seem likely to operate at much the same times and in many of the same places as before".[119] Murray and Knox provide a similar warning that "they [US Armed Forces] must beware above all of substituting technology for strategy and of fielding superior weapons *platforms* rather than effective military *forces*."[120] Few military historians debate the potential benefits to military forces that leverage technology to gain a warfighting advantage, but they debate whether information technology will be the central element of future warfare, or merely a component.

The Australian Defence Force (ADF) and the Australian Army have a dramatically different vision for how NCW will be implemented within the Australian context. While the *NCW Roadmap 2005* clearly recognized the potential value of a networked force, it also stated that "In itself the NCW concept does not dictate how the ADF intends to fight."[121] Instead the ADF views NCW as "a key capability enabler" and that "It is important to note that while NCW can be a powerful means to an end in the ADF context, it will never be an end in itself."[122] Australian doctrine emphasizes that improved information sharing and enhanced situational awareness provides an opportunity for commanders to better synchronize military effects to defeat an enemy. While embracing NCW as a capability enhancement, it sees it as only one of several capabilities necessary to win future conflicts, "Land forces will need to obtain and leverage information, fight as combined arms teams and win in close combat." [123] This difference of approach to the implementation of NCW concepts is well captured by the Australian Army

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[119] Parker, G (ed). *The Cambridge Illustrated History of Warfare*. UK: Cambridge University Press, 2004. P. 372

[120] Knox and Murray. *The Dynamics of Military Revolution 1300-2050.* P.189.

[121] Australian DOD. *NCW Roadmap 2005.* Canberra: Commonwealth of Australia, 2005. P.III

[122] Australian DOD. *NCW Roadmap 2005.* Canberra: Commonwealth of Australia, 2005. P.1.

[123] Australian DOD. *NCW Roadmap 2005.* Canberra: Commonwealth of Australia, 2005. P.28.

removing the 'centric' element of NCW from its description of the concept, instead using the terminology of network enabled warfare.

Section Conclusion

This section has examined how the ADF and Australian Army have adopted a pragmatic approach to implementing NCW concepts within their doctrine, organizations and future warfare concepts. The Australian approach seeks to leverage advantage from NCW, while emphasizing the importance of the human element to future warfare. The Australian Army in particular has captured this approach in the HNA plan, which articulates the importance of information dominance for future warfare, but bounds NCW by describing its approach as a 'network enabled' force. The section finally contrasted this approach with the vision for NCW as proposed by the U.S. DOD Office of Force Transformation, which advocates that NCW as a necessary response to the Information Age. Indeed the proponents of NCW believe that the Information Age itself represents a form of Military Revolution.[124] This more radical embrace of the NCW concept may misrepresent the true benefits that can be achieved through network enhanced technology.

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[124] US DOD Pamphlet, *The Implementation of Network-Centric Warfare,* P.3

CONCLUSION

The central question that this monograph has sought to answer is whether Network Centric Warfare should play a role in the HNA plan for the transformation of the Australian Army? To answer this question, the monograph has investigated the concept of NCW from a variety of positions. The first section sought to describe the concept of NCW and from where the concept had developed. It then catalogued some of the common themes of criticism that have emerged against the concept, and questioned whether NCW could be considered a military revolution, an RMA or neither. The second section of the monograph then critiqued NCW by applying its underlying suppositions against the military theories of Jomini, Clausewitz and Boyd. This section also questions whether NCW proponents believe that NCW can control the nature of warfare, and what is the true role of man and technology in this equation. The third section utilized the development of air power theory in the Twentieth Century as a case study as to the danger of overemphasizing the potential benefits of a technological revolution, and identifies parallels in the thought processes of air power theorists with the proponents of NCW. The final section contrasted the approach to applying NCW concepts between the Australian and U.S. military forces.

The first conclusion that can be drawn from this study is that NCW concepts cannot be ignored and that information age technology does provide military advantage to a force that embraces its underlying themes. A word of caution is however necessary. The air power case study demonstrated that a new technology does not immediately provide overwhelming military advantage as championed by its proponents, but it is through experience, experimentation, and integration with existing systems, that this advantage can be achieved. The corollary to this first conclusion, is that this advantage will be gained incrementally, or evolutionally and not as a sudden revolution as some NCW proponents have argued. "History indicates that the wisest course is to feel one's way along with careful study, radical experimentation, and freewheeling

war games. Paradoxically, revolutionary transformation often can be achieved in evolutionary increments."[125]

The second conclusion arises from the first. The Australian Army must embrace NCW to maintain a competitive advantage in its own region, and to integrate with coalition forces for expeditionary operations. The pragmatic application of NCW for the Australian Army as described in the HNA concept of a 'network enabled' force provides a balanced approach to integrating NCW with current and future warfighting concepts and platforms. The Australian approach also rejects a Jominian belief that technology can provide certainty to future warfare, but embraces the aspect of 'uncertainty' in military operations, and the continued importance of the human dimension in controlling the system. The U.S. DOD Office of Force Transformation should consider adopting this more pragmatic vision of NCW, rejecting those proponents who see NCW as new type of warfare for the Information Age.

Max Boot in *War Made New – Technology, Warfare, and the History – 1500 to Today* offers a warning that supports the above conclusions on the potential military advantage to be gained from NCW. "My view is that technology sets the parameters of the possible; it creates the *potential* for a military revolution. The extent to which various societies and their armies exploit the possibilities inherent in new tolls of war and thereby create an *actual* military revolution depends on organization, strategy, tactics, leadership, training, morale, and other human factors."[126] It is for the military professionals amongst us to ensure that NCW concepts are integrated with existing military concepts, to face the ultimate test for warfighting concepts, the battlefield.

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[125] Boot. *War Made New – Technology, Warfare, and the History - 1500 to Today*. P. 467.
[126] Boot. *War Made New – Technology, Warfare, and the History - 1500 to Today*. P.P. 9-10.

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